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THE PLANT GENUS *POLYGALA* IN THE
GALÁPAGOS ISLANDS

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The five taxa of *Polygala* Linnaeus on the Galápagos Islands are endemics and all are similar morphologically. They perhaps represent a radiation from a single past introduction from mainland South America, similar to those radiations postulated for the justly famous Darwin's finches and the plant genus *Scalesia*. They are members of *Polygala* section *Polygala* series *Tenuis* Chodat, and appear to be most closely related to *P. paludosa* St. Hilaire or *P. paniculata* Linnaeus, two widespread species of the New World tropics.

Both authors have had field experience in the Galápagos Islands. Howell was botanist on the Templeton Crocker Galápagos Expedition of the California Academy of Sciences from April to June, 1932, and later was able to examine type material of the taxa in question in several European herbaria. Porter visited the archipelago in January and February, 1967, while assisting Dr. Ira L. Wiggins in a study of its flora under a National Science Foundation grant to the California Academy of Sciences. Both authors wish to express their gratitude to Dr. Wiggins and to the California Academy of Sciences for making this study possible.

KEY TO THE SPECIES AND VARIETIES OF *POLYGALA* IN THE GALÁPAGOS ISLANDS

1. Stems puberulent; wings 5-7-nerved; aril $\frac{1}{3}$ as long as seed 1. *P. anderssonii*
1. Stems glabrous; wings 3-5-nerved; aril about $\frac{1}{5}$ as long as seed.
 2. Apical crest of keel inconspicuous, not showy or petaloid, divisions simple or 2-lobed, final lobes 6-8; wings 3.5-5 mm. long, 3-nerved.
 3. Leaves linear to oblanceolate-elliptic, acute to cuspidate; racemes becoming elongate, acute, 1.5-12 cm. long; wings 3.5-4 (or 5) mm. long
..... 2a. *P. galapageia* var. *galapageia*
 3. Leaves oblanceolate to linear-lanceolate, obtuse to acute; racemes more congested, oblong or rounded, obtuse to subacute, 1-4 cm. long; wings 4-5 mm. long 2b. *P. galapageia* var. *insularis*
 2. Apical crest of keel conspicuous, showy and petaloid, divisions frequently 3-lobed, final lobes 12-16; wings 4-6.5 mm. long, 5-nerved.
 4. Leaves broadly spatulate to rotundate, 6-13 mm. long, 3-8 mm. wide 3a. *P. sancti-georgii* var. *sancti-georgii*
 4. Leaves narrowly to broadly oblanceolate, 8-25 mm. long, 1-4 mm. wide 3b. *P. sancti-georgii* var. *oblanceolata*

1. *Polygala anderssonii* Robinson.

Polygala puberula ANDERSSON, Kongliga Vetenskaps-Akademiens Handlingar, 1853, p. 232, 1855. ANDERSSON, Kongliga Svenska Fregatten Eugenies Resa omkring jorden . . . åren 1851-1853, Botanik, vol. II, p. 100, 1861. ROBINSON AND GREENMAN, American Journal Science, series 3, vol. 50, p. 145, 1895. Not *P. puberula* GRAY, Plantae Wrightianae Texana—Neo-Mexicanae part I, p. 40, 1852 (Smithsonian Contributions to Knowledge, vol. 3, art. 5).

Polygala galapageia A. W. BENNETT in part as a synonym, Journal Botany, vol. 17, p. 204, 1879.

Polygala anderssonii ROBINSON, Proceedings American Academy, vol. 38, p. 160, 1902. STEWART, Proceedings California Academy Sciences, series 4, vol. 1, p. 85, 1911. CHRISTOPHERSEN, Nyt Magazin for Naturvidenskaberne, vol. 70, p. 80, 1932.

Suffruticose (perennial?), to 1 m. high, rarely branched basally; stems spreading, puberulent, becoming glabrate below, yellowish or rarely reddish; leaves alternate, linear-lanceolate to oblanceolate, acuminate, puberulent to subglabrate, coriaceous, 4-17 mm. long, 1-1.5 mm. wide; petioles less than 1 mm. long; racemes becoming elongate, 3-9 cm. long, about 1 cm. wide, axis puberulent; flowers white to pale purple; pedicels 1 mm. long, glabrous; bracteoles caducous; outer sepals ovate, acute, glabrous, green, margins white, more or less equal, 1.5-2 mm. long, 1 mm. wide; wings petaloid, obovate-elliptic, obtuse, glabrous, 5-7-nerved, 3.5-4.5 mm. long, about 2 mm. wide, longer than capsule; corolla about 3 mm. long; apical crest of keel 12-14-lobed, less than 1 mm. long; capsule oblong, glabrous, equally 2-loculed, loculicidally dehiscent, 3.5-4 mm. long, about 2 mm. wide; seeds 1 per locule, obconical, apex obtuse and more or less apiculate, base attenuate, dark, shortly lanate, trichomes more or less appressed apically, 2.5-3 mm. long; aril elliptical, 2-lobed, obtuse, white, $\frac{1}{3}$ as long as seed.

SPECIMENS EXAMINED. Galápagos, *Cuming 103* (CGE,K). ISABELA: Cowley Bay, not abundant, *Stewart 1775* (CAS,K). SAN SALVADOR: west of lava flow at James Bay, *Howell 9720* (flowers white, more or less tinged with lavender; CAS). SANTA CRUZ: *Andersson* (S, type of *P. puberula* Andersson); north shore, *Snodgrass & Heller 668* (DS); north side, abundant in light ashy soil near shore, *Stewart 1778* (CAS); northwest side, abundant in tufaceous soil near shore, *Stewart 1779* (CAS); in more open spaces in restricted area of *Croton* forest northwest of Academy Bay, 50 feet, *G. Taylor 7* (CAS); south of Conway Bay, *Baur 13* (DS,K).

2. *Polygala galapageia* Hooker fil.

2a. *Polygala galapageia* var. *galapageia*.

Polygala galapageia HOOKER fil., Transactions Linnaean Society, Botany, vol. 20, p. 233, 1847. A. W. BENNETT, Journal Botany, vol. 17, p. 204, 1879. ROBINSON AND GREENMAN, American Journal Science, series 3, vol. 50, p. 145, 1895. ROBINSON, Proceedings American Academy, vol. 38, p. 160, 1902. STEWART, Proceedings California Academy Sciences, series 4, vol. 1, p. 85, 1911.

Polygala galapageia ANDERSSON, Kongliga Vetenskaps-Akademiens Handlingar, 1853, p. 232, 1855. ANDERSSON, Kongliga Svenska Fregatten Eugenie's Resa omkring jorden . . . åren 1851-1853, Botanik, vol. II, p. 100, pl. 10, fig. 1 (m, n, o), 1861.

Polygala galapagensis CHODAT, Mémoires Société de Physique et d'Histoire Naturelle, vol. 31, p. 230, 1893.

Suffrutescent perennial, to about 1 m. high, herbage more or less glaucous; stems spreading, glabrous, reddish below, yellowish above; leaves alternate, numerous, linear to oblanceolate-elliptic, acute to cuspidate, glabrous, coriaceous, 5-15 mm. long, 1-1.5 mm. wide; petioles less than 1 mm. long; racemes becoming elongate, acute, 1.5-12 cm. long, about 1 cm. wide; flowers white or whitish; pedicels less than 1 mm. long, glabrous; bracteoles caducous; outer sepals ovate, acute, glabrous, green, margins white, more or less equal, about 1.5 mm. long; wings petaloid, obovate-elliptic, attenuate, glabrous, 3-nerved, 3.5-4 (or 5) mm. long, 2 mm. wide, more or less equaling capsule; corolla 2-3 mm. long; apical crest of keel inconspicuous, 4-parted and each part simple or 2-lobed, less than 1 mm. long; capsule oblong, glabrous, equally 2-loculed, loculicidally dehiscent, 3-3.5 mm. long, 1.5 mm. wide; seeds 1 per locule, obconical, apex obtuse and more or less apiculate, base attenuate, dark, shortly lanate, trichomes more or less appressed apically, 2-2.5 mm. long; aril narrowly elliptical, 2-lobed, white, about $\frac{1}{3}$ as long as seed.

SPECIMENS EXAMINED. FLOREANA: *Darwin* (CGE, type), *Edmonston* (K), *Andersson* (S). ISABELA: *Macrae* (CGE,K); Tagus Cove, *Crossland 443* (K), *Howell 9510* (stems yellow, leaves green, flowers whitish tinged lavender, CAS), *Snodgrass & Heller 142* (DS), *Snow 307, 327* (DS), abundant from beach to 600 feet, *Stewart 1774* (CAS). MARCHENA: *Snodgrass & Heller 763* (DS). SAN CRISTÓBAL: *Snodgrass & Heller 494* (DS); lower region, southwest end,

Baur 9 (K); Puerto Chico, 20 m., *Schimpff 172* (CAS); Wreck Bay, bushy plant 2–3 feet high, *Howell 8609* (CAS), abundant in sandy soil near shore, *Stewart 1777* (CAS).

The type specimens of *P. galapageia* and *P. obovata* Hooker fil. [*P. galapageia* var. *insularis* (A. W. Bennett) Robinson] in the University of Cambridge herbarium are very different in appearance, which would account for treating them as distinct species. This difference is due largely to the shapes of the leaves: in var. *galapageia* linear-oblongate or linear-oblong and pungently acute; in var. *insularis* broader and obtuse. Although the wings in var. *galapageia* are usually shorter than in var. *insularis*, the wings in flowers of the type of *P. galapageia* are 5 mm. long, the longest measured in any specimen referable to the typical variety.

2b. *Polygala galapageia* var. *insularis* (A. W. Bennett) Robinson.

Polygala obovata HOOKER FIL., Transactions Linnaean Society, Botany, vol. 20, p. 233, 1847. ANDERSSON, Kongliga Vetenskaps-Akademiens Handlingar, 1853, p. 231, 1855. ANDERSSON, Svenska Fregatten Eugénies Resa omkring jorden . . . åren 1851–1853, Botanik, vol. II, p. 99, pl. 10, fig. 2 (c–i, k–m, p), 1861. ROBINSON AND GREENMAN, American Journal Science, series 3, vol. 50, p. 146, 1895. Not *P. obovata* ST. HILAIRE, Flora Brasiliæ Meridionalis, vol. 2, p. 37, 1835.

Polygala obovata fma. *angustifolia* ANDERSSON, Kongliga Vetenskaps-Akademiens Handlingar, 1853, p. 232, 1855. ANDERSSON, Kongliga Svenska Fregatten Eugénies Resa omkring jorden . . . åren 1851–1853, Botanik, vol. II, p. 99, 1861. *P. obovata* var. *angustifolia* (ANDERSSON) RILEY as a synonym, Kew Bulletin, 1925, p. 219, 1925.

Probably also: *P. obovata* fma. *latifolia* ANDERSSON, Kongliga Vetenskaps-Akademiens Handlingar, 1853, p. 231, 1855. ANDERSSON, Kongliga Svenska Fregatten Eugénies Resa omkring jorden . . . åren 1851–1853, Botanik, vol. II, p. 99, 1861. *P. obovata* var. *latifolia* (ANDERSSON) RILEY as a synonym of *P. sancti-georgii*, Kew Bulletin, 1925, p. 219, 1925.

Polygala chatamensis ANDERSSON, Kongliga Vetenskaps-Akademiens Handlingar, 1853, p. 232, 1855. ANDERSSON, Kongliga Svenska Fregatten Eugénies Resa omkring jorden . . . åren 1851–1853, Botanik, vol. II, p. 99, pl. 10, fig. 3 (p, q, r), 1861. *P. galapageia* [var. *galapageia*] ROBINSON in part as a synonym, Proceedings American Academy, vol. 38, p. 160, 1902.

Polygala insularis A. W. BENNETT, Journal Botany, vol. 17, p. 204, 1879. ROBINSON AND GREENMAN, American Journal Science, series 3, vol. 50, p. 146, 1895.

Polygala galapageia var. *insularis* (A. W. Bennett) ROBINSON, Proceedings American Academy, vol. 38, p. 161, 1902. STEWART, Proceedings California Academy Sciences, series 4, vol. 1, p. 86, 1911.

Differing from var. *galapageia* in having stems 30–45 cm. high, reddish; leaves oblanceolate to linear-lanceolate, obtuse to acute, more or less apiculate, 6–10 mm. long, 1–2 mm. wide; racemes oblong or rounded, obtuse to subacute, 1–4 cm. long, about 1 cm. wide; wings 4–5 mm. long.

SPECIMENS EXAMINED. Galápagos, *Andersson* (K), *Andersson 181* (K). FLOREANA: "Charles and Chatham," *Andersson* (S). MARCHENA: occasional in

tufaceous soil near the shore, *Stewart 1776* (CAS,K). PINTA: fairly abundant on lava beds in lower part, *Stewart 1773* (CAS). SAN CRISTÓBAL: *Darwin* (CGE, type of *P. obovata* Hooker fil.), *Andersson* (S, type of *P. chatamensis* Andersson, GH, isotype), *Andersson 182* (K); northern Chatham, *Baur 7* (K); Cerro Brujo, north coast, *Snow 350* (DS); Sappho Cove, abundant on sand beaches, *Stewart 1782* (CAS). SANTA CRUZ: Academy Bay, common on lower parts, *Stewart 1783* (CAS).

Riley (Kew Bull., 1925, p. 219) was probably in error when he referred Andersson's broad-leaved form of *P. obovata* to *P. sancti-georgii*. Neither at Stockholm nor at Kew was an Andersson specimen seen that would be referable to *P. sancti-georgii*. It would seem probable that Andersson was distinguishing by name the two leaf-forms of *P. galapageia* which are represented by his collections. These formal names, however, were not seen on any Andersson collections, a fact that adds to the difficulty of placing them definitely.

The type of *P. chatamensis* Andersson would appear to represent a seedling stage of *P. galapageia* var. *insularis*, although in general aspect it looks more like var. *galapageia*. However, in the type of *P. chatamensis*, the leaves, although linear-oblong or linear-oblongate, are obtuse, the inflorescence is short-congested and rounded above, and the wings are over 4 mm. long. These details do not correspond to Andersson's figure of *P. chatamensis* which is more like *P. galapageia* var. *galapageia*.

3. *Polygala sancti-georgii* Riley.

3a. *Polygala sancti-georgii* var. *sancti-georgii*.

Polygala sancti-georgii RILEY, Kew Bulletin, 1925, p. 218, 1925.

Polygala obovata var. *latifolia* Riley as a synonym, Kew Bulletin, 1925, p. 219, 1925.

Probably not *P. obovata* fma. *latifolia* ANDERSSON, Kongliga Vetenskaps-Akademiens Handlingar, 1853, p. 231, 1855, basonym of Riley's name.

Herbaceous annual, 15–50 cm. high, herbage glaucous; stems spreading, glabrous, reddish; leaves alternate, usually numerous and crowded, broadly spatulate to rotundate or rarely narrowly spatulate, obtuse, cuspidate, glabrous, coriaceous, blade decurrent into petiole, 6–13 mm. long, 3–8 mm. wide; petioles less than 1 mm. long; racemes 1.5–3.5 (–6) cm. long, 1.5 cm. wide; flowers purplish to white; pedicels 1 mm. long, glabrous; bracteoles caducous; outer sepals ovate, acute, glabrous, green, margins white, more or less equal, 1.5–2 mm. long, 1 mm. wide; wings petaloid, ovate-elliptic, more or less obtuse, glabrous, 5-nerved, 6–6.5 mm. long, 2–3 mm. wide, longer than capsule; corolla about 3 mm. long; apical crest of keel conspicuous, petaloid, 14–16-lobed, about 1 mm. long; capsule oblong, glabrous, equally 2-loculed, loculicidally dehiscent, 3.5–4 mm. long, 2 mm. wide; seeds 1 per locule, obconical, apex obtuse and more or less apiculate, base attenuate, dark, shortly lanate, trichomes more or less appressed apically, 2.5–3 mm. long; aril narrowly elliptical, 2-lobed, white, about $\frac{1}{2}$ as long as seed.

SPECIMENS EXAMINED. Galápagos, *Mr. Brace* (K). FLOREANA: *Hicks 424* (K, type); Cormorant Bay, abundant on sand beaches, *Stewart 1780, 1781* (CAS), sand dunes, *Wiggins & Porter 564* (CAS); Post Office Bay, beaches and environs at east end, *Wiggins & Porter 531* (CAS).

As mentioned under *P. galapageia* var. *insularis*, no specimens of *P. sancti-georgii* were seen among Andersson's collections either in Stockholm or Kew. Hence, it is believed that his *P. obovata* forma *latifolia* should be referred to *P. galapageia* var. *insularis*, not to *P. sancti-georgii*. The epithet, *sancti-georgii*, is taken from the name of the yacht, *St. George*, which in 1924 visited the Galápagos Islands on the "St. George Pacific Expedition," under the auspices of the Scientific Expeditionary Research Association of England.

3b. *Polygala sancti-georgii* var. *oblanceolata* Howell.

Polygala sancti-georgii var. *oblanceolata* HOWELL, Leaflets of Western Botany, vol. 10, p. 351, 1966.

Differing from var. *sancti-georgii* in having stems 25–60 cm. high; leaves narrowly to broadly oblanceolate, obtuse to acute, 8–25 mm. long, 1–4 mm. wide; racemes 2–7 (–12) cm. long, 1–1.5 cm. wide; flowers light to deep lavender; wings oblanceolate-elliptic, 4–6 mm. long, 2–2.5 mm. wide; corolla 3.5 mm. long; apical crest of keel 12–14-lobed, about 1.5 mm. long, lobes broad and pink; seeds 2.5 mm. long.

SPECIMENS EXAMINED. RÁBIDA: slopes at north end, *Howell 9737* (stems and leaves glaucous, flowers light to deep lavender, CAS, type), *DeRoy & DeRoy 31* (DS), *Baur 6, 8* (GH), north side, elevation 50 feet, *Bowman, 30 July 1957* (CAS). SAN SALVADOR: near the shore, Sullivan Bay, *Howell 10021* (stems and leaves glaucous, flowers white tinged lavender, CAS). SANTA CRUZ: Conway Bay, *Baur 4* (GH, K), near the shore, *Howell 9851* (CAS), sandy patch near the coast, *Cheesman 400* (K); 2 miles inland, *Cheesman 401* (K).